MARKED UP VERSION OF SUBSTITUTE SPECIFICATION

~~System for locking and adjusting the tilt of a vehicle seat and method for~~ of ~~assembling said system~~ RECLINER MECHANISM AND METHOD OF ASSEMBLY

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

The present Application claims the benefit of priority to the following international Applications: PCT Patent Application No. PCT/EP2004/002161 titled "System for Locking and Adjusting the Tilt of a Vehicle Seat and Method for Assembling Said System" filed on March 4, 2004 which published under PCT Article 21(2) on September 30, 2004 as WO 2004/082981 A1 in the German language and German Patent Application No. 103 12 136.6 filed on March 19, 2003 (which are hereby incorporated herein by reference in their entirety).

BACKGROUND

The present invention generally relates to a system or recliner mechanism for locking and adjusting the tilt of two parts of a vehicle seat, such as a seat base part and a seat backrest part, with respect to each other, comprising two fittings which can be fitted on each side of the vehicle seat and are connected to each other via a transmission rod ~~acting as an adjusting means, the transmission rod engaging axially in each case in a fastening opening of a structural element of a fitting and being held in a profiled inner contour. Furthermore,~~ The invention also ~~relates to a method for assembling such a system.~~

~~**Prior art**~~

Fittings or recliner mechanisms for adjusting and locking the tilt of two components of a vehicle seat, such as a seat base part and a backrest part, with respect to each other are known ~~in numerous embodiments and described, for~~. For example, ~~in the documents~~ DE ~~198 45 698 A1, DE 195 22 854 A1 and US 4 836 608 A. The~~ 19845698 A1 discloses a fitting for adjusting the tilt of backrests of motor vehicle seats that ~~is disclosed in DE 195 22 854 A1~~ has a first articulated part and a second articulated part, one of which is connected fixedly to the seat and the other of which is connected fixedly to the backrest. In this case, the second articulated part is coupled pivotably to the first articulated part and has a latching

toothing which can be fixed in different pivoting positions by means of a locking lever formed therewith for engagement purposes. The locking lever has a mating toothing corresponding to the latching toothing of the second articulated part. The two toothings can be blocked in engagement positions by means of a blocking lever. The blocking lever is mounted pivotably on the first articulated part and locking lever and blocking lever have mutually complementary control surfaces. The blocking lever in turn bears an arresting lever, which is mounted pivotably, can be displaced via an adjusting means and has a lug which, in a first pivoting position of the arresting lever and in the case of the blocking position of the blocking lever ~~—this is~~(i.e., the blocking position of the fitting~~—~~) bears against a stop surface of the first articulated part. In a second pivoting position, the lug is situated away from the stop surface of the first articulated part and therefore enables blocking lever and locking lever to freely pivot, i.e. to be unlocked.

The device according to US ~~4 836 608~~4,836,608 A also has a similar construction to the fittings mentioned. DE ~~195 22 854~~19522854 A1 and DE ~~198 45 698~~19845698 mention and illustrate Bowden cables, and US ~~4 836 608~~4,836,608 A mentions and illustrates a handling device formed integrally with the clamping element as adjusting means, for moving a structural element of the fitting, such as a clamping element, which is to be pivoted counter to the force of a spring and is also referred to or could be referred to in the documents mentioned as clamping cam, unit of blocking lever and arresting lever, "operation lever" or clamping eccentric. If fittings of this type, which are usually also called "recliners", are fitted on each side of a vehicle seat, a synchronization is necessary so that the fittings lock in the same angular position in each case during an adjustment of the tilt. In the case of recliners which are activated via Bowden cables, there is not sufficient excess travel in the system, and so an adjustment is necessary in order to compensate for tolerances. This adjustment is usually undertaken in the mechanism on the Bowden cables.

A system of the type described at the beginning, for which a transmission rod is used as the adjusting means, is described in GB ~~2 059 496~~2059496 A. The transmission or actuating rod engages at both of its ends in fittings which are fitted on each side of a seat. In this case, in particular, the actuating rod can engage axially in each case in a fastening opening of a structural element which serves, for example, for the clamping and has a profiled inner contour for holding the transmission rod in a form-fitting manner. Due to the permissible tolerances of the

various structural elements in the recliner, the profiled inner contour which holds the transmission rod can be at different positions from the left recliner to the right recliner. This leads to distortions and makes a compensation necessary. Furthermore, the transmission rod, when passed directly through the seat, may be situated too close to the sitting region, and so it has to be moved via a mechanism.

~~Object~~

~~The invention is based on the object of improving~~Accordingly, it would be desirable to provide an improved a system for locking and adjusting the tilt, of the type described at the beginning, using structurally simple means in such a manner that an optimized synchronization between the two fittings, which can be fitted on each side of the vehicle seat~~, is made possible. In addition, the invention is based on the object of indicating~~. It would also be desirable to provide an improved method for assembling such a system.

~~Achievement~~

SUMMARY

~~This object is achieved by an additional~~An exemplary embodiment of the present invention relates to a fitting or recliner mechanism having a molded part which can be inserted into ~~the~~a fastening opening and can be fastened therein and has ~~the~~a profiled inner contour for holding ~~the~~a transmission rod in ~~a~~the fastening opening of the molded part in a form-fitting manner.

~~According to the method~~Another exemplary embodiment of the present invention~~, this object is achieved in that,~~ relates to a method wherein in a preassembly step, ~~the additional~~a molded profile part, which has ~~the~~a profiled inner contour for holding ~~the~~a transmission rod in a fastening opening of the molded profile part in a form-fitting manner, is inserted into ~~the~~a fastening opening of the structural element of the fitting, which is preferably situated in a locking position, and is fastened therein, after which, in a main assembly step, the transmission rod is inserted into the fastening opening of the molded profile part.

~~With the use of~~By providing the molded part ~~according to the invention~~, the two fittings can therefore be synchronized at a very early point, ~~i.~~(e.~~already~~g. at their

assembly stage, etc.) and do not have to be coordinated with each other later in a further assembly operation. Different fitting positions in each case of the structural element, which has the fastening opening for the transmission rod, which positions may occur due to the permissible tolerances in the two fittings, can thereby be compensated for in a simple manner, and the transmission rod can be fitted in a manner free from distortion. In this case, the profiled inner contour of the molded profile can be oriented in any desired position in an infinitely variable manner advantageously irrespective of the design of the contour of the fastening opening.

~~In a preferred, particularly assembly friendly~~Another exemplary embodiment~~,~~ of the present invention relates to a molded part that can be fastened in ~~the~~a fastening opening of a structural element in a frictional and form-fitting manner, in particular by being pressed in. In this case, in order to increase the form-fitting frictional connection, the fastening opening of the structural element can have a profiled structure on its periphery, in particular a fine toothing arranged on its inner circumference.

Another exemplary embodiment of the present invention relates to a recliner mechanism system for locking and adjusting tilt of a vehicle seat. The system includes a fitting defining a fastening opening and configured to be provided at a side of the vehicle seat, and an insert part occupying the fastening opening and configured to receive a transmission rod. An inner periphery of the insert part has a profiled contour for receiving the transmission rod in a form-fitting manner.

Another exemplary embodiment of the present invention relates to a method of assembling a recliner mechanism system for locking and adjusting tilt of a vehicle seat. The system includes a two fittings which are configured to be provided at opposite sides of the vehicle seat and coupled to each other via a transmission rod axially aligned with a fastening opening of each fitting. The method of assembling the system includes the steps of inserting an insert part into the fastening opening of at least one of the fittings, the insert part having a profiled inner contour for supporting the transmission rod in a form-fitting manner, coupling the insert part to the fitting, and inserting the transmission rod into the insert part.

Further advantageous embodiments of the invention are contained in the subclaims and in the special description below.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is explained in more detail with reference to an exemplary embodiment which is illustrated in the attached ~~drawing~~drawings, in which:

~~fig.~~FIGURE 1 ~~shows, in~~is a perspective ~~illustration,~~view of a system ~~according to the invention~~ for locking and adjusting the tilt~~,~~ according to one exemplary embodiment; and

~~fig.~~FIGURE 2 ~~shows, in~~is an enlarged, perspective exploded ~~illustration in comparison to fig. 1,~~view showing a structural element of a fitting of the system ~~according to the invention,~~ a molded profile part which can be inserted into the structural element and a transmission rod.

DETAILED DESCRIPTION

In the ~~various figures of the drawing~~FIGURES, identical parts are ~~always also~~ provided with the same reference numbers, and ~~so~~ they are generally also only described once in each ~~case~~exemplary embodiment.

~~A system according~~With reference to the ~~invention~~FIGURES, a system is provided for locking and adjusting the tilt of two components of a vehicle seat with respect to each other. The system can be used in particular for adjusting the tilt of a seat part and a backrest part.

~~Fig.~~FIGURE 1 shows~~,~~ a system of this type ~~comprises~~comprising two fittings B1, B2 which can be fitted on each side of the vehicle seat and are connected to each other via a transmission rod R acting as an adjusting means.

As ~~fig.~~FIGURE 2 illustrates in detail, the transmission rod R engages axially (axis X-X) ~~in each case in~~ a fastening opening O of a structural element BS of a fitting B1, B2. ~~According to the invention, an~~ An additional molded profile part F is provided which can be inserted into the fastening opening O of the structural element BS and can be fastened therein and has a fastening opening OF with a profiled inner contour K for holding the transmission rod R in a form-fitting manner.

The structural element BS of the particular fitting B1, B2 in which the transmission rod R can be fastened or is fastened in the installation state may be, ~~in particular~~for example, a pivotable clamping element of the fitting B1, B2. Each fitting B1, B2 may comprise a first fitting part 1 and a locking element (not illustrated) which can be fixed in certain positions with respect to the first fitting part 1 under the action of a spring and is fastened to a second fitting part 2 which can be fixed in a changeable manner in its tilt in relation to the first fitting part. The clamping element counters the force of the spring as structural element BS serves to cancel the fixing of the locking element on the first fitting part ~~1 counter to the force of the spring.~~1.

~~The~~According to one nonexclusive exemplary embodiment, the fastening opening O of the structural element BS ~~can preferably as illustrated have~~has a profiled structure on its periphery, ~~in particular~~for example, a fine toothing Z arranged on its inner circumference.

The molded profile part F ~~can preferably~~may be designed, in a favorable manner in terms of production, as a plastic bushing. It may advantageously consist of reinforced plastic, ~~in particular of~~ for example a glass fiber reinforced polyamide, such as PA 6.6. GF with 15 ~~per cent~~percent glass fibers.

The molded profile part F can thereby be fastened in the fastening opening O in a frictional and form-fitting manner (e.g., ~~in particular~~ by being pressed in—, etc.) which takes place cold under the formation of chips or is associated with a forming of the outer contour of the molded profile part F after heating, with the result that a secure and rotationally fixed fit in the structural element BS is obtained.

During the fitting in the fastening opening O of the structural element BS, the molded profile part F may be positioned in such a manner that its profiled inner contour K is arranged in a defined position with reference to the fitting B1, B2. With the production of the reference, the fitting B1, B2 should preferably already be in a very substantially assembled and locked state, with the result that the tolerances which are permissible in the unlocking are not effective.

In this case, the defined position may be defined by one or more of a marking point, which is identified by way of example in ~~fig.~~FIGURE 2 by the reference

number P, of the profiled inner contour K from one or more reference points of the fitting B1, B2, such as axes of holes present in the fitting. The axes may, on the one hand, be the axes of openings in the first fitting part 1, such as the pivot axis X1 of first fitting part 1 relative to the second fitting part 2 and/or the axes X2, X3 of fastening openings for a component of the seat, such as a seat part, or, on the other hand - as an alternative or in addition - the axes of openings in the second fitting part 2, such as again the pivot axis X1 of first fitting part 1 relative to the second fitting part 2 and/or the axis X4 of a fastening openings of the fixing element and/or the axes X5, X6 of fastening openings for a component of the seat, such as a backrest part. In this case, the reference to the second fitting part 2 ~~is the~~may be preferred ~~technical solution~~, since the molded profile part F is fitted in the second fitting part 2 and tolerances which become effective are therefore smaller than with reference to the first fitting part 1, which does not have any direct connection to the molded profile part F. The defined position may be described - as mentioned - by distances, but also by angles being a Cartesian or polar system of coordinates.

The profiled inner contour K of the molded profile part F may be formed - as illustrated - radially symmetrically to its central axis or to the longitudinal axis X-X of the transmission rod R. It is characteristic of rotationally symmetrical figures, such as regular polygons, that they contain as component parts recurring basic figures, such as triangles, which can be brought into overlap by rotation through a certain central angle. This central angle can advantageously be 30°, 60° or 90° in the case of a rotationally symmetrical embodiment of the inner contour K. In the illustration shown, in which the transmission rod R has a hexagonal profile, the central angle is 60°.

As an alternative, the profiled inner contour K of the molded profile part F may also be formed asymmetrically with reference to the longitudinal axis X-X of the transmission rod R. As a result, a coded assembly, i.e. an assembly which can only be carried out in a certain position, of the rod R in the molded profile part F is possible.

~~The~~According to an exemplary embodiment, the transmission rod R, both in the case of a symmetrical and asymmetrical design of its profile, may have, upon its axial engagement in the profiled inner contour K of the molded profile part, a maximum play of 4°, during a rotational movement about its axis X-X, in

particular a play of +/- 2°, on each side of the axis X-X. This permissible play facilitates the installation and brings about a further compensation for the tolerance-induced differences in position of the structural element BS in the one fitting B1 and in the other fitting B2, but without the functionality of the system ~~according to the invention~~ being impaired.

According to ~~the~~an exemplary embodiment of a method of ~~the invention of the~~assembling a system for locking and adjusting the tilt of two components of a vehicle seat with respect to each other includes, in a preassembly step, inserting the additional molded profile part F ~~is inserted~~ into the fastening opening O of the structural element BS and ~~is fastened~~fastening the molded profile part F therein. This takes place after the fitting B1, B2 as such is already assembled, or is at least partially assembled ~~to the greatest possible extent~~. The latter means that, in the assembly, individual parts of the fitting B1, B2, such as a wall part or the like, may still be missing. In this case, the operating capability of the fitting B1, B2 is to be produced to the extent such that the locking position can be produced in which the molded profile part F is preferably to be inserted.

~~In~~According to one exemplary embodiment, in the main assembly, it is possible~~, on the one hand~~, to insert the transmission rod R at its ends into the two fittings B1, B2 and then to fit the fittings B1, B2 to the component of the vehicle seat, for example the seat part or backrest part. ~~On the other hand~~ According to another exemplary embodiment, it is ~~also~~ possible ~~first of all~~ for only one fitting B1, B2 to be connected to one end of the transmission rod R in the described manner, and then for both fittings B1, B2 - one of which without the molded profile part inserted - to be fastened to the component of the vehicle seat, and only subsequently for the molded profile part F to be inserted into the other fitting B2, B1 in each case and for the other end of the transmission rod R to be inserted into the molded profile part F, with the transmission rod R advantageously serving as an installation aid.

Before the main assembly step is carried out, it is also possible for the fitting B1, B~~2~~2, without molded profile part F or as a preassembled unit of fitting B1, B2 and molded profile part F, to be subjected to a painting operation, in particular a cathodic dip painting operation, at a temperature of 180°C to 200°C. The painting is preferably also to be carried out in the locking position of the fitting B1, B2, so that the bearing surfaces of the corresponding fitting parts, which are in contact in

the locking position, are not coated by the paint which would result in the production of further tolerances. ~~Of course, in~~In this case the thermal stability of the material of the molded profile part F ~~has to~~should preferably exceed the temperatures to be expected during painting. As an alternative, the metallic components may also be painted before the molded profile part F is inserted.

The invention is not restricted to the exemplary embodiments illustrated, but also comprises all of the embodiments acting with the same effect within the context of the invention. Thus, in particular, the shaping of the inner contour K of the profile part F may deviate from the embodiment illustrated. Furthermore, it is also possible for the molded profile part F to be fastened in the fastening opening O of the structural element in a different manner from being pressed in - for example, bonding or injection molding as a type of fastening also appears possible. Injection molding is preferred insofar as the molded profile part F can thereby also be given undercuts which advantageously promote the formation of the form-fitting connection.

Furthermore, ~~the expert can supplement the invention by means of~~those of ordinary skill in the art who review this disclosure will readily appreciate that additional advantageous measures be provided without departing from the framework of the invention. Thus - as likewise illustrated graphically - the transmission rod R can be laid without an additional mechanism in a region which is sufficiently spaced apart from a sitting region - at the front in ~~fig.~~FIGURE 1.

A further advantage, ~~hitherto not mentioned,~~ of the system ~~according to the invention~~ is that unlocking levers which are effective in the fittings B1, B2 can ~~always~~ be brought into a standard nominal position, with nominal position being understood to mean a position as has been conceived on the drawing board. For example, this nominal position may be a central position of three possible locking positions with a different tilt of the fitting parts 1, 2 with respect to each other in each case. This advantage ~~is in particular~~may be of importance if the system ~~according to the invention~~ is used in vehicle seats which are situated in the second or the third row in a motor vehicle, with it also being possible, for example, for three seats arranged next to one another to be provided with the system ~~according to the invention~~. The handles used for operating the system can be brought here into the same vertical positions in each case and Bowden cables, which may be provided for the adjustment, of the different systems ~~according to the invention~~ can

be designed with the same, fixedly set length in each case.

With regard to the component BS, it should also be added that this may be a clamping element which is designed in ~~a~~any suitable manner ~~known per se~~ and - as described at the beginning - is referred to as clamping cam, clamping eccentric etc. However, it may also be a component which differs in its design from the known clamping elements.

MARKED UP VERSION OF SUBSTITUTE SPECIFICATION

~~**Reference symbols**~~

~~1 First fitting part of B1, B2~~
~~2 Second fitting part of B1, B2~~

~~B1 First fitting~~
~~B2 Second fitting~~
~~BS Structural element of B1, B2, in particular clamping element~~
~~F Molded profile part~~
~~K Contour in OF~~
~~O Fastening opening of BS~~
~~OF Fastening opening of F~~
~~P Marking point of K~~
~~R Transmission rod~~
~~X1-X6 Axes in B1, B2~~
~~X-X Longitudinal axis of R, central axis of OF~~
~~Z Finetoothingin0~~